

AMENDMENT TO THE DRAWINGS

The attached sheet of drawings includes changes to Fig. 8A. This sheet, which includes Figs. 8A, 8B and 8C, replaces the original sheet including Figs. 8A, 8B and 8C.

Attachment: Replacement Sheet, 1 page

REMARKS/ARGUMENTS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office Action, and amended as deemed necessary to place the application into condition for allowance.

Specifically, by this Amendment claims 1 and 4 have been amended, and claims 5, 6, 7 and 9 have been canceled. No new claims have been added to the application. Accordingly, claims 1 and 4 are pending in the application. No new matter has been added.

In addition, by this Amendment Fig. 8A has been amended by submitting a Replacement Sheet, which also includes Figs. 8B and 8C. The only changes made to Fig. 8A relate to the direction the arrows point. In the original Fig. 8A, the arrows were inadvertently drawn such that they pointed in the wrong direction. The arrows in Fig. 8A have been redrawn to point in the proper direction and are now consistent with the explanation of the method set forth in the specification. Because the changes to Fig. 8A are minor, no annotated sheet has been provided. Acceptance of the corrected drawing sheet is respectfully requested.

In the prior Office Action, the Examiner rejected claims 1 and 4 under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner stated that the phrase "added with a pH buffer, or provided with a pH buffer action" in lines 6-7 of claim 1 made the claim indefinite because it was unclear how the pH buffer could perform an action without being added to an alkaline solution.

In response, applicant has amended claim 1 to specify that the alkaline solution comprises a pH buffer. As noted in the specification, a pH buffer can be added to an alkaline solution, or the alkaline solution itself can be provided with pH-buffer action (see p. 6, lines 5-6). The former case occurs when a pH buffer compound is added to an alkaline solution comprising an alkali dissolved in water. The latter case occurs when the alkali compound itself provides pH-buffer action. This occurs, for example, when the alkaline solution comprises only sodium carbonate (Na_2CO_3), which produces an alkaline solution that also provides pH-buffer action. This is demonstrated in the Examples (see, e.g., Process Liquids L and T).

To address the Examiner's concerns, applicant has amended claim 1 to specify that the alkaline solution comprises a pH buffer. Claim 1 thus covers both instances, namely the instance in which a pH buffer compound such as sodium carbonate (Na_2CO_3) is present with another alkali compound such as sodium hydroxide (NaOH), and also the instance in which a pH buffer such as sodium carbonate (Na_2CO_3) is used by itself to form the alkaline solution. In view of the amendments made to claim 1, reconsideration of the rejection is respectfully requested.

Also in the prior Office Action, the Examiner rejected claims 1 and 4 under 35 U.S.C. §103(a) as being unpatentable over Soyama et al. (JP 2002-012990) in view of Kovacs et al. (US 5,211,663). In view of the amendments made to claims 1 and 4 herein, and for the reasons set forth below, applicant respectfully requests reconsideration of the rejection.

Soyama et al. discloses a method for forming a passive layer on stainless steel that involves immersing the stainless steel in an alkaline solution and then directing cavitation air bubbles at the surface of the stainless steel. Collapse of the cavitation air bubbles at the surface of the stainless steel causes the alkaline liquid to be driven into contact with the stainless steel at high force, which Soyama et al. teaches causes the stainless steel to generate a passive layer.

Kovacs et al. discloses a method for forming a passive layer on stainless steel that involves immersing the stainless steel in an alkaline solution. A passive layer is formed spontaneously or with the aid of galvanic action. Kovacs et al. teaches that in the preferred embodiment of the invention, the stainless steel is immersed in the alkaline solution for about 24 hours at a temperature of about 35 to 40° C (see col. 5, lines 5 and 6).

In the prior Office Action, the Examiner contends that Soyama et al. teaches applicant's invention as claimed in claim 1 with the exception that the air bubbles are from external air and that the treatment temperature is 40-60°C. The Examiner states that one having ordinary skill in the art would have been motivated by Kovacs et al. to oxygenate the alkaline solution according to Soyama et al. by bubbling with external air to improve the passivation process, and would have been motivated to heat the alkaline solution to a temperature within the range claimed in claim 1

because Kovacs et al. teaches a passivation temperature range that overlaps the temperature range of claim 1. Applicant respectfully submits that even if one were somehow motivated to combine the teachings of Soyama et al. and Kovacs et al., the resulting combination will still not read on claim 1, as amended herein.

Claim 1 has been amended to read as follows (bold, italicized emphasis added):

A stainless steel member passivation treatment method for forming a passive film on a surface of the stainless steel member, said method comprising the steps of:

providing an alkaline solution having a pH of 9 to 12, said alkaline solution comprising a pH buffer;

immersing the stainless steel member in the alkaline solution at 40 to 60°C **while air is being blown into the alkaline solution to form air bubbles** that increase the amount of oxygen dissolved in the alkaline solution and thereby promote the formation of hydroxides constituting the passive film, wherein the hydroxides constituting the passive film are produced from metal ions constituting the stainless steel and hydroxide ions in the alkaline solution, and wherein the pH buffer suppresses a reduction in the pH of the alkaline solution that would otherwise be caused by the dissolution of carbon dioxide into the alkaline solution by the air bubbles; and

after the immersing step, thermally drying the member at 100 to 200°C.

Applicant notes that the specification (page 12, lines 19-21) expressly teaches blowing air into the alkaline solution to increase the amount of dissolved oxygen in the alkaline solution and that Fig. 1A graphically depicts and therefore discloses and illustrates that the air bubbling occurs while the stainless steel member is immersed in the alkaline solution. Thus, the amendments to claim 1 clearly add no new matter.

As noted, Soyama et al. teaches the use of cavitation air bubbles. Cavitation air bubbles are not formed by blowing air into a liquid. They are created by forming areas of low pressure within a liquid, which cause the liquid to transition from a liquid phase into a vapor phase. Thus, the bubbles formed by cavitation cannot add oxygen (or carbon dioxide) to the liquid because the bubbles are merely a vapor form of the liquid. No external oxygenating gas is added via the cavitation process. Soyama et al. teaches the use of cavitation bubbles for a completely different

purpose, namely for the purpose of driving the liquid against the surface of the stainless steel at great force when the cavitation bubbles collapse.

Kovacs et al. does teach that an alkaline solution can be oxygenated by bubbling air through it (see col. 5, lines 53-54). The single statement in Kovacs et al. regarding air bubbling appears in the context of the steps for preparing the alkaline solution for use. Kovacs et al. does not expressly teach that air should be blown into the alkaline solution during treatment and is thus completely silent regarding the concept of blowing air into the alkaline solution while the stainless steel member is immersed therein. Accordingly, the combination of Kovacs et al. and Soyama et al. would not read on applicant's invention as claimed in claim 1. For if one were motivated for some reason to combine the teachings of Kovacs et al. and Soyama et al., one would simply oxygenate an alkaline solution in a preparation step by bubbling air into it as taught by Kovacs et al., and then immerse a stainless steel member in that aerated solution while using a cavitation device to induce the formation of cavitation bubbles in the alkaline solution that would collapse on the surface of the stainless steel member as taught by Soyama et al. and bring the liquid into contact with the stainless steel member at great force. This is not what is claimed in claim 1, and thus the Examiner's combination of Soyama et al. and Kovacs et al. fails to establish a *prima facie* case of obviousness as to claim 1.

In addition, applicant notes that neither reference fairly teaches or suggests the use of a buffer compound for the purpose of preventing a reduction in pH of the alkaline solution during processing caused by an increase in dissolved carbon dioxide by virtue of the air being blown into the alkaline solution while the stainless steel member is immersed therein. Neither reference recognizes the importance of a pH buffer in this context and is thus silent about the use of a pH buffer for this purpose and as claimed.

Finally, applicant notes that neither Soyama et al. nor Kovacs et al. fairly teaches thermally drying the stainless steel member at 100-200°C as claimed in claim 1. The Examiner states that drying temperature is simply a matter of routine optimization, and that applicant has not demonstrated the criticality of the claimed drying temperature range. Applicant respectfully submits that insofar as the Examiner's first contention is concerned, routine optimization would clearly lead

away from applicant's invention as claimed and that insofar as the Examiner's second contention is concerned, the Examiner is clearly mistaken that applicant has not demonstrated the criticality of the claimed drying temperature range.

The criticality of applicant's claimed drying temperature is addressed first. Fig. 3 clearly demonstrates the criticality of the drying temperature on the formation of a passive film. Corrosion current density is lowest when drying was accomplished between 100°C and 200°C. Higher and lower drying temperatures had adverse affects on the passive film.

The Examiner mischaracterizes Fig. 3 in the prior Office Action. In the second paragraph of page 13 of the Detailed Action portion of the Office Action, the Examiner states that "Fig. 3 is drawn to the temperature of the passivation and not the drying temperature." This is clearly erroneous. From page 15, lines 18, to page 16, line 9, applicant explains how the data reported in Fig. 3 was obtained and the consequence of that data. Test pieces having passive films formed on them were dried at different heating temperatures (all for 10 minutes). The test pieces that were heated between 100°C and 200°C exhibited the lowest corrosion current density, thus demonstrating the criticality of the claimed drying temperature.

Soyama et al. and Kovacs et al. do not provide any teachings regarding the criticality of drying temperature insofar as it affects corrosion current density. And routine optimization would not lead to the drying temperature as claimed. As noted by the Examiner in the Office Action, drying temperature directly affects how fast a passive layer becomes dry (see page 5, second complete paragraph of the Office Action). Thus, from the viewpoint of cost-effective production of a stainless steel product having a passive film coated thereon, one having ordinary skill in the art would view a shorter drying time as optimal and hence would be motivated to select a higher drying temperature to accomplish the drying process in less time. Thus, routine optimization would not have led one having ordinary skill in the art to applicant's relatively low drying temperature of 100 to 200 °C., but rather it would have led away from applicant's claimed drying temperature. Applicant notes that the relationship between drying temperature and corrosion current density is only disclosed by applicant's specification. Thus, one having ordinary skill in the art would not have selected a temperature within the range claimed in the exercise of

routine optimization. One having ordinary skill in the art would have selected a higher drying temperature. Thus, the rejection of claim 1 (and dependent claim 4) is thus clearly improper. Reconsideration is respectfully requested.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SHM-15962.

Respectfully submitted,

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